I claim:

1. A voltage regulator comprising:
- a voltage regulator output for providing a regulated output voltage,
- internal electrical regulation feedback path, and
- an internal nonreactive resistor, which is arranged in an internal load branch of the voltage regulator in such a way that it is located electrically in series with an external load to be connected to the voltage regulator output, wherein the voltage regulator is set up in such a way that
- its internal electrical regulation feedback path is tapped both at a first point upstream of the internal nonreactive resistor and at a second point downstream of the internal nonreactive resistor, the second point being located between the internal nonreactive resistor and the voltage regulator output, and
- for frequencies above a predetermined frequency the regulation is essentially effective directly via the first point, while for frequencies below the predetermined frequency, the regulation is essentially effected via the path first point - internal nonreactive resistor - second point.

2. The voltage regulator as claimed in claim 1, comprising
- a regulating amplifier, which has two inputs and an output, and
- a controlled current source,

wherein
- the first input of the regulating amplifier serves for connection to a reference voltage source,
- the second input of the regulating amplifier is connected to the electrical feedback path which leads outside the regulating amplifier from the output of the regulating amplifier via the controlled current source to the second input of the regulating amplifier,
- between the controlled current source and the second input of the regulating amplifier, an electrical output path branches from the electrical feedback path

to the voltage regulator output, in which the internal nonreactive resistor is arranged in series between the branching and the voltage regulator output,

- the voltage regulator furthermore has a frequency diplexer, which has two inputs and an output,
- the frequency diplexer is connected into the electrical feedback path in series by its first input and its output in such a way that its first input points in the direction of the branching of the electrical output path and its output points in the direction of the second input of the regulating amplifier,
- the second input of the frequency diplexer is connected to a further electrical path which branches from the electrical output path between the internal nonreactive resistor and the voltage regulator output, and
- the frequency diplexer is designed in such a way that
- the frequency diplexer transmits signals having frequencies above a predetermined diplexer frequency from its first input to its output,
- the frequency diplexer transmits signals having frequencies below the predetermined diplexer frequency from its second input to its output, and
- the respective other internal path of the frequency diplexer is essentially blocked for signals from the respective other frequency range.

3. The voltage regulator as claimed in claim 2, wherein the maximum coupling factor of the frequency diplexer from its first input to its output is greater than or equal to the maximum coupling factor from its second input to its output.

4. The voltage regulator as claimed in claim 2, wherein the regulating amplifier is an operational amplifier.

5. The voltage regulator as claimed in claim 2, wherein

- the further electrical path has a voltage divider circuit and
- the second input of the frequency diplexer is connected to the further electrical path between resistors of the voltage divider circuit.

6. The voltage regulator as claimed in claim 2, wherein the frequency diplexer is a passive RC filter.

7. The voltage regulator as claimed in claim 6, wherein the frequency diplexer has a voltage divider circuit.

8. The voltage regulator as claimed in claim 1, wherein the internal nonreactive resistor is embodied as a parallel circuit of N individual resistors, where N is greater than 1.

9. The voltage regulator as claimed in claim 2, wherein the controlled current source is embodied as a parallel circuit of N individual controlled current sources, where N is greater than 1.

10. The voltage regulator as claimed in claim 1, wherein

- the internal nonreactive resistor is embodied as a parallel circuit of N individual resistors, where N is greater than 1,
- the controlled current source is embodied as a parallel circuit of N individual controlled current sources, where N is greater than 1,
- each of the N individual controlled current sources is in each case electrically connected directly to its respectively associated individual resistor from the set of N individual resistors, thereby producing N direct electrical connections between the N individual controlled current sources and the N individual resistors,
- the N direct electrical connections are not electrically interconnected, and
- the first input of the frequency diplexer is directly connected only to one of the N direct electrical connections.

11. The voltage regulator as claimed in claim 1, wherein the controlled current source or at least one of the N individual controlled current sources is a transistor.

12. The voltage regulator as claimed in claim 11, wherein the transistor is a FET or a bipolar transistor.

13. The voltage regulator as claimed in claim 1, comprising an internal capacitance which is located electrically in parallel with the external load to be connected to the voltage regulator output and is arranged in an electrical branch which branches in the direction of ground between the internal nonreactive resistor and the voltage regulator output.

14. The voltage regulator as claimed in claim 1, wherein the dimensions of its components are chosen such that a frequency at which its transfer function has a zero is less than its transition frequency.

15. The voltage regulator as claimed in claim 1, wherein it is embodied as an integrated circuit.